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Longmans' Junior Mathematics

N V Brindley

Teacher's Guide

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Longmans

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Longmans' Junior Mathematics

Teacher's Guide to Stage 2

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Longmans

First published 1967

Longmans, Green and Co Ltd
48 Grosvenor Street
London W1
Associated companies, branches and
representatives throughout the world

Printed in Great Britain
by Neill and Co Ltd, Edinburgh

Contents

General Introduction

Action is the basis of thought. *Piaget*

What you have been obliged to discover for yourself leaves a path in your mind. *Lichtenberg*

Mathematics is a language, in which relationships between objects in the physical world can be expressed concisely and in such a way that new relationships become apparent. These relationships may be expressed in English or French or any other language, but much less concisely and usefully.

Mathematics is a language. This statement is not a metaphor or an analogy; mathematics is not *like* a language—it *is* a language.

Before a child can understand and use any word, he must have experience in some form of its meaning. The word 'elephant' can have no meaning to a child who has not experienced either the real animal or an adequate representation of it in the form of film, still picture or, less usefully, verbal description. By far the most effective of these is first-hand experience through all the relevant senses. The same is true of the language of mathematics.

A child may be able to pronounce a word, but, without understanding, this is a useless accomplishment. An adult can read the word 'polyolefin', but unless he has had experience of the substance referred to, he cannot use the word correctly. Even if he copies someone else's usage, he gives only the appearance of understanding.

In the same way, a child can learn the mechanics of computation without understanding. He can even reproduce examples of its usage, and give the appearance of understanding. But without first-hand experience there is no real understanding and no correct application in new situations.

The first necessity for a child is, then, experience of objects in the physical world, and of the relationships between them. The best way of ensuring that such relationships have sufficient impact is for the child to discover them for himself. But if he is left alone to explore, his progress will

be slow and erratic. He must be put in the right environment, so that his effort is directed to the right ends. This is the purpose of this series of text-books.

The mathematics we normally use describes the real world. But there are many different systems of mathematics, each derived logically from a different set of axioms—statements which cannot be proved but must be accepted without proof. Each system is logically consistent, and valid within its own limitations. But most of these do not describe the real world. Only when the axioms correspond to the real world is the system valid for this world. It is possible to devise a mathematical system in which $7+5=4$, and in which mathematical problems could be logically solved. But this would be no use in dealing with the real world, in which $7+5=12$. The German philosopher Immanuel Kant took as one of the bases of his philosophy the erroneous belief that an abstract statement such as $7+5=12$ is known to be true intuitively. But the Swiss educationalist Jean Piaget has shown that statements such as this, which adults take for granted, are not immediately apparent to children. An axiom cannot be proved logically, but it can and must be proved empirically, by seeing that it corresponds to the real world. Only by using our physical senses can we understand the basic principles of mathematics.

These basic principles and laws, which to many seem so obvious as to need no justification, are as follows.

The principle of conservation: a number remains the same however it may be grouped.
The principle of reversal: if $a+b=c$, then $a=c-b$ and $b=c-a$; and if $ab=c$, then $a=c/b$ and $b=c/a$.
The commutative law of addition: $a+b=b+a$.
The commutative law of multiplication: $ab=ba$.
The associate law of addition: $(a+b)+c=a+(b+c)$.
The associative law of multiplication: $(ab)c=a(bc)$.
The distributive law of multiplication:
$a(b+c)=ab+bc$.
The distributive law of division: $\frac{b+c}{a}=\frac{b}{a}+\frac{c}{a}$.

If these laws and principles seem too obvious to merit attention, consider that the commutative laws of division and subtraction do not hold, nor do the distributive laws of addition or subtraction; and that in matrix algebra the commutative law of multiplication does not hold (i.e. $ab \neq ba$).

The adult's understanding of these principles of normal mathematics is based on life-long experience. Children must be given this experience before they proceed to formal computation, which will otherwise be not only a waste of time but the cause of confusion, fear and trouble.

Each stage of computation in number, money, weights or measures must be preceded by the relevant practical experience. When this has been done, computation will come more easily to the child, who will appreciate how, why and when to use each process.

The necessary practical work is done by using the abacus and by the practical exercises. It is not enough for the child just to read the text or for the teacher to read it to him. Reading may in fact present difficulties of comprehension if each page is read straight through. Let the child, however, perform each step as he reads and difficulties of comprehension will disappear. This may still leave difficulties of understanding the meaning, not of the words but of the actions. The child must think. Indeed, in this way, he is forced to think. There is no learning by rote, no easy way out, no magic spell. Thinking is hard work, but it leads to the understanding which must precede the correct use of computation.

Practice in the translation of normal physical situations into number is provided by the writing of stories or problems as equations. The whole purpose of such translation is to allow new relationships to become apparent, by applying the processes of computation. Even when this has been done, the result is useless, unless it can be translated back into terms of real life. It is, therefore, essential that after each piece of translation the answer is written in a normal English sentence with a sensible meaning. These hypothetical situations serve as a purpose, but they can never

replace the use of real situations which occur in school or at home in everyday life.

The reverse process, that of composing problems involving a given piece of computation, is useful in that the child must understand the process, otherwise the result may well be nonsense; it will help the teacher by revealing any lack of understanding on the part of the child.

This is the translation of theoretical situations. An essential part, however, of any mathematics or science course is the recording of practical experiment. The child's first attempts will certainly be verbose and obscure. This is a normal and necessary stage; the child will then realise that symbolic description is only another form of this. Wordy description must eventually give way to tabulation and graphical representation. This in turn will lead to interpretation of the tables and graphs in terms of real life. Here the child is laying the foundations of more advanced mathematics.

Once the type of practical work required has been appreciated by the teacher, more and more instances will present themselves at every turn. Every packet, tin and bottle in the kitchen will suggest practical work. Every unusual shape of container, every list of figures, every piece of scrap material will be the basis of practical exercises by the children.

It is obvious that limitations of material, apparatus and space are such as to make it impossible for the whole class to do the same practical exercises at the same time. If, however, the children are allowed to progress through the book at their own pace, this difficulty will not arise. It may be possible for the children to do the practical work in groups, though care must be taken to see that every child take part, and is not a passive spectator.

With the increase of automation and cybernetics, the requirements of the world of the near future will be, not unskilled or semi-skilled labour, but more and more scientists, technicians and technologists, all of whom will need to use mathematics to express relationships in the physical world. But such relationships, however simple or complicated, are science. Mathematics is, then, the language of

science. It is, indeed, 'Queen and Handmaiden of the Sciences'.

Special Note to the Teacher

Each part of the text of the pupil's book which requires written work in the exercise book (apart from the Practices) is printed in a second colour. This should ensure that the pupil does not omit any necessary work.

The meanings of words printed in the pupils' text in bold type will be found in the reference pages at the end of each Stage.

Apparatus required for Stage Two

Paper and stapler for making books
Abacus (hundreds, tens and units) and counters for each child
Abacus (pounds, shillings and pence) and money or counters for each child
Set of fraction strips (see page 23)
Clock face (see page 29)
Packet of drinking straws
Stop watch (or watch with second-hand)
Money (preferably real, otherwise card or plastic) (see page 49)
Squared card (one-inch squares)
Squared paper (quarter-inch squares are suitable)
Scissors
Plate (circular)
Set of weights
Scales
24 pennies
Drawing pins
Thread
Cardboard
Hole punch
Calendar for current year
Shapes board marked in square inches (see page 81)

Teaching Notes

1 Magic Squares

The name is kept because it is traditional, but it could be misleading. Terms such as 'the magic of numbers', like those which refer to 'mathematical tricks', do only disservice to the understanding of mathematics and science.

A true magic square uses numbers which run in sequence from one. Those in Practice 1 are not, then, true magic squares. For an exposition of the different orders of magic square and their construction, the teacher is referred to Henry Dudeny's *Amusements in Mathematics* (Nelson).

All these squares can be completed by logical thinking, beginning with the sum of the three numbers in a line.

The use of exercise books with squares marked on the pages is invaluable, both for place notation and for help in drawing graphs and diagrams.

As a supplementary exercise, the children could place counters in a frame to make magic squares. The purpose of this exercise is merely revision of addition and subtraction.

2 Writing Numbers

The pupils must carry out the practical work; reading about it is not enough. The abacus should not now be needed for computation, but is still an essential piece of apparatus for investigation into the meaning of the various methods used. It is advisable to have counters of a different colour in each column.

3 Using Yourself as a Measure

This is not an easy exercise. The children must be as accurate as possible, but approximate answers

should be accepted. The results should be properly tabulated, as shown in Stage One.

4 Zero

The children have already used zero as a place-holder but probably without realising the significance. They must understand now that zero has only one purpose in notation—to fill an empty space so that other figures in the number can be seen in their correct positions. The use of zero as the origin on a graph framework and in a line of directed numbers will come later. By itself, zero means nothing—we have nothing, we do nothing. Zero, by itself, never occurs in any real-life situation.

6 How Big?

The idea that a figure has a different value according to which column it is in is not easy for a child to grasp. In particular, the great difference between 1 in the hundreds column and 1 in the units column is not always apparent, even to an adult. This is especially important when approximate answers are required; the amount of error when using round numbers is small (except when, by multiplication, the units become hundreds or thousands).

The squares could be duplicated on card or stout paper; there is no value, and some danger of inaccuracy, in the child's drawing the squares. There is, however, some value in the child's cutting out the squares himself.

7 Naming Lines

A capital letter is, by convention, used to identify a point; the straight line is named by giving two points on the line. No purpose is served by introducing extended or directed lines at this stage.

8 Shopping

The pupil should be allowed to use coins, preferably real. A very useful classroom aid, which does not depreciate with use and from which actual loss has been shown to be negligible, is £3 worth of change, arranged as follows: 8×2/6 10×2/- 10×1/- 10×6d 12×3d 18×1d 12×½d.

However, children who have developed sufficient money sense to be able to visualise the coins required may be allowed to find the answers mentally.

9 Block Graphs

Tabulation must always precede the drawing of a graph. A study of the table will show how the axes should be divided and named or numbered.

The proportions between the quantities are actually shown by the areas of each block. Where the blocks are equal in width, as here, the proportions are shown by the height. Where the blocks are equal in height, the proportions are shown by the width, in which case the graph becomes a bar-graph.

The blocks may be coloured with crayons, or may be cut out of coloured gummed paper. The gathering of information may be a group activity, but each child must make his own graph.

10 Addition

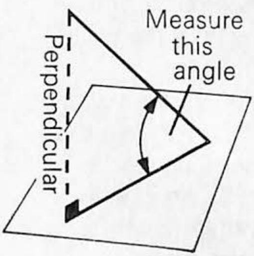
Addition is simply a rearrangement of what is already there. Addition does not make a number bigger. If we have three objects and add two more, we have not increased the three to five; the two objects added must have been in existence and to hand before they were added. We have merely rearranged three objects and two objects to make five objects.

Although the squares and strips are too clumsy to use for normal investigation, they should be used occasionally as a reminder of the relative values of the counters and figures in the different columns.

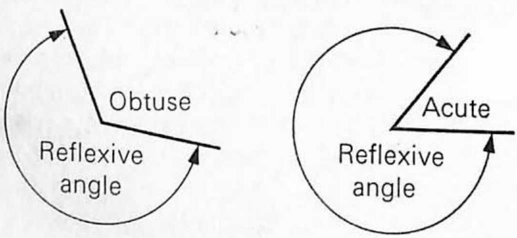
There are many different methods of addition; the pupil should discover these, and decide when to use them. Nevertheless, it is convenient to have a standard method which may be used when other methods do not appear suitable.

The exercises are useful, but much more valuable are real-life examples drawn from the children's own environment.

11 Angles



The question of what constitutes the angles between a line and a plane may arise here. This could be answered satisfactorily by marking in chalk the projection of the line on to the plane. Reflexive angles are not considered here, as any reflexive angle must also incorporate an obtuse or an acute angle.



12 Subtracting Shillings and Pence

Real shillings and pennies are the ideal counters to use on this abacus, although imitation coins will probably be more convenient.

As with numbers, a variety of methods can be used, but a standard method is always useful in case of need.

13 Using the Fraction Strips

These strips are the same as those used in Stage One, but at this point each piece could with advantage be marked with the fraction it represents.

The questions asked here are a guide to the pupil, but he should also be encouraged to investigate for himself the relationships between the strips. Whatever he finds should be expressed as an equation, e.g. $\frac{1}{3}+\frac{1}{4}+\frac{1}{6}=\frac{3}{4}$.

14 Subtraction

The pupils *must* carry out the practical work using the abacus; reading is not enough.

15 Time

An individual clock-face for the pupil would be useful, but it should be of the type in which the hour and minute hands are geared.

16 More Measuring

The child should check his estimate by actually laying the straws on the ground. This will help in visualising the problem of dividing the length of one straw into the length of the room.

17 Reversals

It is essential that the pupil should understand that a situation can be described mathematically in several ways, just as he must understand that the same equation, graph or matrix can describe several different situations.

18 How Long is a Minute?

The pupil should eventually learn to count, with a steady rhythm, at about one per second; early numbers could be lengthened by the inclusion of 'and': '. . . eleven *and* twelve *and* thirteen, fourteen . . .'

The child should record experiments such as this not only with lists of figures but also in written description.

19 Dividing Shillings and Pence

The abacus is still needed, not as an aid to computation, but as an aid to understanding.

21 Dinner Money

The best way for the pupil to gain an understanding of this is for him to help with the collection and counting of dinner money (or savings, or any other collection). A visit to the bank to see the money paid in would be of great value to the children, and could lead to interesting discussions (though this would in some ways anticipate some of the work in Stage Three).

23 Graphs

The vertical lines are essential at this stage, not only to show the connection between the thermometer and the graph, but also as a link for the child between the x and y measurements.

24 Line Graphs

The numbers along the x-axis must be arranged in a significant order. Sets of numbers which are collected in no meaningful order (e.g. the number of each type of pet owned by pupils, as in Stage One) are not suitable for line graphs. If, however, the pets are arranged in order of weight, or height, or cost, a line graph could be drawn which might reveal something previously concealed in the list of numbers.

25 Counting On

There is no value in learning tables by rote. There is a variety of ways in which individual items can be learnt; it is best to use a combination of counting on, the commutative law and reversals. However, a pupil who cannot remember a combination should be allowed to refer to the table at the end of the book.

27 Another Way of Subtracting

The pupil should have a variety of methods to hand, so that he can readily use the most convenient, and also be able to check by using a different method.

28 More Line Graphs

The pupil is here introduced to the graph of a function, in this case $y = bx$. Unlike graphs previously encountered, these are continuous, so that intermediate points have a meaning. This introduces the notion that the graph can supply information not apparent in the table, a vital step in the use of graphs.

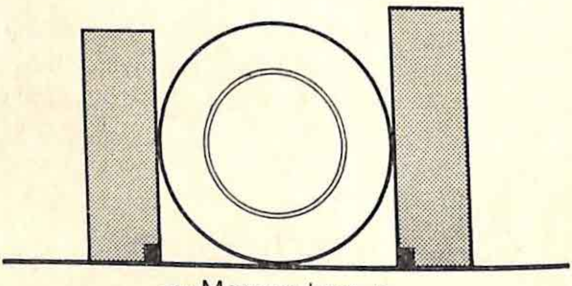
30 Symbols

In modern mathematics, increased attention is given to precision of statement; in particular, to the distinction between things and the names of things, between operations or relations and the symbols that stand for them.

The confusion of words with things can lead to muddled thinking, as one of the pioneers of modern mathematics, Lewis Carroll (C. L. Dodgson, author of *Symbolic Logic*) showed many times in his 'Alice' books. A number has no existence of itself; phrases such as 'the twoness of two' can be misleading. Two, five, etc., are merely adjectives used to describe certain sets of objects. For centuries, philosophers discussed the existence of such concepts as 'honesty', 'truth', or 'redness', being misled by the grammatical noun, when the only valid form is the adjective.

The best definition of number is that given by Bertrand Russell: a number is the set of all sets of which the elements can be put into a one-to-one correspondence with each other.

31 How Big is a Plate?



← Measure here →

In measuring the diameter, it is not enough to place a ruler across the plate, as this might not be across the widest part. The principle must be that of sliding calipers. The plate should be placed bottom up.

In measuring the circumference, string may be placed tightly round the rim while the plate is

pressed down (still with the bottom up), and then measured. Alternatively, the plate may be rolled along a flat surface, the start and finish both being marked and the distance then being measured. In both cases, slipping must be avoided. This will be more easily done if the pupils work in groups of two or three.

32 Sets

A set can be any collection of any things (which are called *members* or *elements*). The pupil will soon learn, however, that the only interesting sets are those in which the elements have some common property. Sets should be *well-defined*; there should be no ambiguity in the description. For example, 'the set of all tall Scotsmen' is not well-defined, as it gives no criterion for 'tall' or even for 'Scotsman'.

There is nothing new in the idea of sets; the pupil will have been thinking in sets for many years, but without using that name. Set theory has grown out of the logician's idea of 'classes', and is described in Boolean algebra, devised by George Boole (1815-1864), author of *Laws of Thought*. Although the name is not used in the pupil's books, the basic laws of Boolean algebra are given in Stages Three, Four and Five.

This algebra was originally applied to syllogisms—logical arguments—but, without altering any of the laws, it can be applied to such diverse subjects as the switching of electrical circuits, operations on sets, and the validity of combinations of statements.

The mathematics which is described by set notation is not necessarily new, but the use of Boolean algebra can make clear information which was previously obscure.

33 The Empty Set

Numbers 6, 8 and 10 in Practice 52 are null sets. Care must be taken to see that the sets the pupil

gives as null sets are well-defined and are indeed null sets. For example, 'the set of giants' may not be a null set, depending on the definition of 'giant'; 'the set of people more than 150 years old' is probably not a null set.

34 Addition of Money

The use of ten-shilling notes to represent the tens avoids having to divide the total number of shillings by 20. However, if the pupil prefers to add the tens and units simultaneously and convert to pounds by counting on in 20's, as in Section 22, he should not be discouraged.

36 Shapes

The tables lead the pupil to appreciate the common properties of quadrilaterals, rectangles and squares. In this way, the set of squares is seen as a proper subset of the set of rectangles, which is a proper subset of the set of quadrilaterals.

The pupil may be encouraged to add other questions to the tables, so that he can learn by his own investigation.

37 Multiplication is Addition

The only difference here is in the setting out. The pupil should find himself 'counting on' or using the multiplication form, even when the work is set out as addition.

38 The Timetable

The pupils could follow this by asking and answering questions on the local bus or train timetable.

39 The Set of Weights

This arrangement of weights, in which each weight is doubled to obtain the next one, is the most economical if the weights are to go into one pan only. If, however, it is permitted to put weights in both pans of the balance, then the most economical arrangement is obtained by trebling each time, i.e. 1, 3, 9, 27, etc.

41 Triangles

This is another example of using tabulation to find, by inspection, the properties of the set of triangles and of some of its subsets.

44 Changing Fractions

There is no value, as regards this exercise, in the pupils's drawing the squares (though it could make an exercise in the technique of measuring and drawing). There is, however, value in the pupil having six cards, each of twelve squares, and cutting five of them into the appropriate fractions.

The exercise could, of course, be done using the fraction strips, but a variety of practical approaches is always valuable, to avoid the pupil's connecting the fractions with one model only.

45 Weighing Pennies

Tabulation of a progressive series should always lead to the drawing of a line graph.

46 Solving Equations

This is much simpler and just as valid as the older method of equal addition. $14-x=8 \Rightarrow 14-8=x$ is better than

$$14-x=8$$

Add x to each side.

$$14 \quad = 8+x$$

Subtract 8 from each side.

$$14-8=x$$

48 Drawing a Circle

The pupil's understanding of the nature of a circle is helped more by the thread and the card strip than by a pair of compasses. The former clearly shows that the distance from the centre to the circumference remains constant, whereas the latter involves the intermediary of the fixed angle between the legs of the compasses.

49 Useful Letters

This type of statistical table lends itself better to a block graph than to a line graph, as the order of the figures depends on the sequence of letters in the alphabet, which is purely arbitrary, and so a continuous line would have no meaning. If a line graph is drawn, the points should be joined by straight lines, not by a smooth curve.

50 Remainders

The pupil will probably have come across remainders before in his practical work. The purpose of this section is to emphasise the realistic and common-sense approach, both in the use of fractions where possible, and in the interpretation of results, as shown in the answers to Practice 80.

52 Naming Sets

Braces enclosing the members of a set indicate that the order does not matter. Ordinary brackets signify that the order does matter. For example, the co-ordinates of a point are written as an *ordered pair*, such as (3, 2), in which the correct order is essential. This use of sets will be dealt with in Stage Four.

53 Naming the Empty Set

The Greek letter ϕ is sometimes used, but the symbol is actually a zero with a stroke through it. In the same way, the symbol for the *universal set* is a one with a stroke through it. In both cases, the stroke is merely to avoid confusion with numerals.

58 Area

Shapes boards can be bought, but are easily made. The one-inch grid is the most useful, but some interesting investigations can be made on other grids, such as equilateral triangles, or a circle (with outlying pins for making tangents). Rubber bands of different colours are useful.

As well as answering the questions set here, the pupils should explore shapes on the board for themselves. They could work in pairs, asking each other original questions about shape and area.

61 More Areas

The pupils should not be allowed to say, 'Two inches times three inches . . .' The dimensions of the rectangle should be read, 'two inches by three inches'; the area is 'two times three-square-inches', which readily becomes 'two-times-three square inches'.

62 Sums in Two Parts

The first requirement is that the pupil should be able to analyse a situation into its constituent parts. Later, the use of brackets will be introduced as a shortened form of this setting out.

Answers

1 Magic Squares

8+1+6 = 15 3+5+7 = 15 4+9+2 = 15
8+3+4 = 15 1+5+9 = 15 6+7+2 = 15
8+5+2 = 15 6+5+4 = 15
The answer is 15 each time.

PRACTICE 1

1)

5	4	9
10	6	2
3	8	7

2)

7	12	5
6	8	10
11	4	9

3)

10	11	6
5	9	13
12	7	8

4)

10	8	18
20	12	4
6	16	14

5)

36	6	48
42	30	18
12	54	24

6)

8d	6d	1s 4d
1s 6d	10d	2d
4d	1s 2d	1s

7)

9d	1s 2d	7d
8d	10d	1s
1s 1d	6d	11d

8)

2s	1s 11d	2s 4d
2s 5d	2s 1d	1s 9d
1s 10d	2s 3d	2s 2d

9)

1′ 4″	6″	8″
2″	10″	1′ 6″
1′	1′ 2″	4″

10)

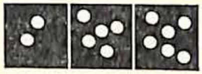
1′ 6″	4″	1′ 2″
8″	1′	1′ 4″
10″	1′ 8″	6″

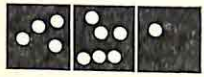
2 Writing Numbers

The biggest number of counters you can have in the units column is 9.
We have ten counters now.
We must remove the ten counters from the units column, and put one in the tens column.
The number is 90.
The largest number is 99.
There are ten counters in the units column.
We must take them off and put one in the tens column.
Now there are ten counters in the tens column.
We must remove the ten counters from the tens column and put one counter in the hundreds column.

PRACTICE 2 1) 132 2) 246 3) 163 4) 315 5) 271
6) 428 7) 194 8) 56 9) 721 10) 332

PRACTICE 3

1 

2 

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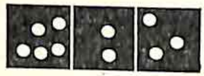
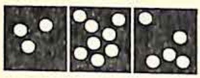
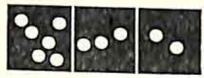
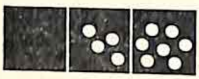
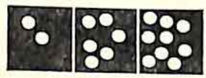
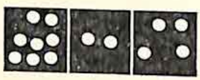
4 

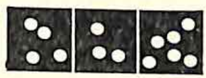
5 

6 

7 

8 

9 

10 

PRACTICE 4 1) 9 23 76 190 248 350
2) 4 87 165 211 524 632
3) 453 473 476 511 553 673
4) 53 158 311 424 512 635
5) 18 134 144 351 421 772

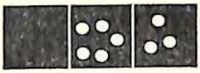
3 Using Yourself as a Measure

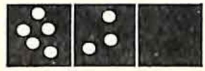
Various measurements of end-joint of thumb, span, shoe, cubit.
Tabulated measurements of exercise book, door and room.

PRACTICE 5

1) 300 2) 30 3) 3 4) 50
5) 740 6) 65 7) 237 8) 305
9) 46 10) 500 11) 270 12) 605
13) 40 14) 405 15) 653 16) 5
17) 261 18) 520 19) 800 20) 13

PRACTICE 6

1 

2 

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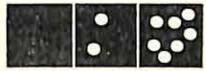
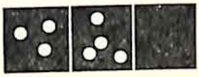
4 

5 

6 

7 

8 

9 

10 

PRACTICE 7 1) $\frac{1}{3}$ 2) $\frac{1}{4}$ 3) $\frac{1}{2}$ 4) $\frac{1}{4}$ 5) $\frac{1}{6}$

6) $\frac{1}{5}$ 7) $\frac{1}{3}$ 8) $\frac{1}{4}$ 9) $\frac{1}{2}$ 10) $\frac{1}{4}$

PRACTICE 8 1) $\frac{3}{4}$ 2) $\frac{2}{3}$ 3) $\frac{2}{5}$ 4) $\frac{5}{6}$ 5) $\frac{3}{8}$

6) $\frac{5}{8}$ 7) $\frac{3}{4}$ 8) $\frac{3}{5}$ 9) $\frac{7}{8}$ 10) $\frac{4}{5}$

6 How Big?

There are ten units in each strip.

There are ten strips in each large square.

There are a hundred units in each large square.

We use counters because squares and strips would be too big.

PRACTICE 10 1) 134 2) 253 3) 188 4) 206 5) 181

6) 150 7) 29 8) 242 9) 119 10) 374

PRACTICE 11 1) The line is PQ. 2) X————Y

3) CD is shortest, because it is a straight line.

AB,BC XY,YZ MN,KL (or MN,KN and MN,NL).

5) AB and CD WX and YZ GH and KL.

PRACTICE 12

1)

	s	d
Chessmen	7	3½
Draughts	3	2
Chessboard	2	1
	12	6½

Change: 7s 5½d

2)

	s	d
Large jigsaw	5	3
Doll	6	4
Garage	7	6
	19	1

Change: 11d

3)

	s	d
Garage	7	6
Minilorry	1	5
Minicar	1	1½
	10	0½

Change: 9s 11½d

4)

	s	d
Compendium	4	7½
Doll	6	4
Small jigsaw	3	6½
	14	6

Change: 5s 6d

5)

	s	d
'Engineero'	5	9
Paint box	2	10
'Ludo'	1	9½
	10	4½

Change: 9s 7½d

6)

	s	d
Small jigsaw	3	6½
Large jigsaw	5	3
Paint box	2	10
	11	7½

Change: 8s 4½d

7)

	s	d
Compendium	4	$7\frac{1}{2}$
Small jigsaw	3	$6\frac{1}{2}$
Minicar	1	$1\frac{1}{2}$
	9	$3\frac{1}{2}$

Change: 10s $8\frac{1}{2}$d

8)

	s	d
Car	2	7
Boat	4	8
Aeroplane	6	$11\frac{1}{2}$
	14	$2\frac{1}{2}$

Change: 5s $9\frac{1}{2}$d

9)

	s	d
'Engineero'	5	9
2 minilorries	2	10
Boat	4	8
	13	3

Change: 6s 9d

10)

	s	d
2 small jigsaws	7	1
2 boats	9	4
3 minicars	3	$4\frac{1}{2}$
	19	$9\frac{1}{2}$

Change: $2\frac{1}{2}$d

PRACTICE 13 $(1\times 2\text{s }6\text{d})+(3\times 2\text{s})+(2\times 6\text{d})+(5\times 1\text{d})+(2\times \frac{1}{2}\text{d})$
$= 2\text{s }6\text{d} + 6\text{s} + 1\text{s} + 5\text{d} + 1\text{d}$
$=$ 10 shillings

1) 2s 6d+2s+1d+1d = 4s 8d (four coins)

2) 2s 6d+6d+1d+1d = 3s 2d (four coins)

3) 2s 6d+6d+6d+$\frac{1}{2}$d = 3s $6\frac{1}{2}$d (four coins)

4) 2s 6d+2s+2s+6d+6d = 7s 6d (five coins)

5) 2s 6d+2s+6d+1d+1d+1d = 5s 3d (six coins)

6) 2s+2s+2s+1d+1d+1d+1d = 6s 4d (seven coins)

7) 2s 6d+2s+6d+6d+1d+1d+1d = 5s 9d (seven coins)

8) $2s\ 6d + 2s + 2s + 1d + 1d + 1d + 1d + 1d + \frac{1}{2}d$
$= 6s\ 11\frac{1}{2}d$ (nine coins)

9) $2s\ 6d + 2s + 2s + 6d + 1d + 1d + 1d + \frac{1}{2}d = 7s\ 3\frac{1}{2}d$ (eight coins)

10) This amount cannot be paid exactly.

9 Block Graphs

We put the days on the horizontal axis because we chose to count the numbers each day.
We put the numbers of dinners on the vertical axis because this is what we found out.
Various block graphs

10 Addition

When we add, we have the same number of things that we started with.
424

PRACTICE 14

1) 423	2) 661	3) 641	4) 942	5) 452
6) 872	7) 343	8) 928	9) 605	10) 580
11) 385	12) 832	13) 501	14) 900	15) 826
16) 634	17) 547	18) 704	19) 395	20) 831

PRACTICE 15

1) $169 + 184 = 353$ There are 353 children in the school.
2) $276 + 178 = 454$ England scored 454 in both innings.
3) $159 + 157 = 316$ There are 316 books altogether.
4) $229 + 198 = 427$ Father travelled 427 miles altogether.
5) $467 + 368 = 835$ 835 seats were taken.
6) $785 + 137 = 922$ Joan had 922 stamps altogether.
7) $75 + 268 = 343$ There were 343 passengers on the train.
8) $247 + 186 + 469 = 902$ 902 people visited the exhibition.

9) 288+250+288 = 826 The lorries delivered 826 boxes
10) 117+109+78+64 = 368 There were 368 children in the school.

PRACTICE 16 *Five stories.*

PRACTICE 17
1) acute
2) acute
3) obtuse
4) right angle
5) obtuse
6) right angle
7) acute
8) acute
9) acute
10) obtuse

PRACTICE 18
1) 1s 8d
2) 1s 7d
3) 2s 3d
4) 8d
5) 6s 4d

PRACTICE 19
1) 9s 9d
2) 5s 2d
3) 11s 1d
4) 4s 10d
5) 7s 11d
6) 2s 7d
7) 7s 6d
8) 5s 3d
9) 7s 3d
10) 2s 5d
11) 4s 8d
12) 2s 5d
13) 4s 2d
14) 2s 5d
15) 4s 10d
16) 1s 4d
17) 3s 11d
18) 2s 1d
19) 6s 8d
20) 10d

PRACTICE 20
1) 1s 11d
2) 1s 2d
3) 3s 9d
4) 7s 10d
5) 4s 5d

PRACTICE 21
1) 17s 2d−12s 5d = 4s 9d
17s 2d−4s 9d = 12s 5d
2) 16s 4d−9s 6d = 6s 10d
16s 4d−6s 10d = 9s 6d
3) 8s 11d+5s 4d = 14s 3d
14s 3d−5s 4d = 8s 11d
4) 7s 6d+10s 6d = 18s
18s−10s 6d = 7s 6d
5) 12s−7s 8d = 4s 4d
12s−4s 4d = 7s 8d

PRACTICE 22
1) 6s 6d+8s 9d = 15s 3d Sally had 15s 3d from them both.
2) 8s 6d−4s 7d = 3s 11d Jean had to give 3s 11d.
3) 2s 6d+1s 9d = 4s 3d Mother paid them 4s 3d.
4) 18s 6d−11s 10d = 6s 8d Tom needs 6s 8d more.

5) 5s 8d+1s 10d = 7s 6d Mother had given 7s 6d.

6) 4s 7d+3s 10d+5s 8d = 14s 1d Helen saved 14s 1d in three weeks.

7) 6s 3d−3s 11d = 2s 4d The tie was reduced 2s 4d.

8) 7s 6d+6s+1s 6d+1s 9d+8d = 17s 5d Mother had 17s 5d.

9) 6s−1s 7d = 4s 5d The torch cost 4s 5d.

10) 7s 6d+1s 5d+1s 3d = 10s 2d Terry could not buy them all.

PRACTICE 23 *Five stories.*

13 Using the Fraction Strips

Two quarters are needed to make a half.
Three sixths are needed to make a half.
Four eights are needed to make a half.
Six twelfths are needed to make a half

$\frac{1}{2}=\frac{2}{4}=\frac{3}{6}=\frac{4}{8}=\frac{6}{12}$ $\frac{1}{3}=\frac{2}{6}=\frac{4}{12}$ $\frac{2}{3}=\frac{4}{6}=\frac{8}{12}$

$\frac{1}{4}=\frac{2}{8}=\frac{3}{12}$ $\frac{3}{4}=\frac{6}{8}=\frac{9}{12}$ $\frac{1}{6}=\frac{2}{12}$ $\frac{5}{6}=\frac{10}{12}$

PRACTICE 24
1) $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$ 2) $\frac{1}{2}+\frac{1}{6}=\frac{2}{3}$ 3) $\frac{1}{3}+\frac{1}{6}=\frac{1}{2}$
4) $\frac{1}{6}+\frac{1}{12}=\frac{1}{4}$ 5) $\frac{1}{4}+\frac{1}{12}=\frac{1}{3}$ 6) $\frac{5}{12}+\frac{1}{3}=\frac{3}{4}$
7) $\frac{1}{3}+\frac{1}{4}=\frac{7}{12}$ 8) $\frac{5}{12}+\frac{1}{4}=\frac{2}{3}$ 9) $\frac{3}{4}+\frac{1}{12}=\frac{5}{6}$
10) $\frac{7}{12}+\frac{1}{6}=\frac{3}{4}$

PRACTICE 25
1) $\frac{5}{6}-\frac{1}{3}=\frac{1}{2}$ 2) $\frac{3}{4}-\frac{1}{12}=\frac{2}{3}$ 3) $\frac{2}{3}-\frac{5}{12}=\frac{1}{4}$
4) $\frac{5}{6}-\frac{3}{4}=\frac{1}{12}$ 5) $\frac{2}{3}-\frac{1}{2}=\frac{1}{6}$ 6) $\frac{11}{12}-\frac{1}{4}=\frac{2}{3}$
7) $\frac{3}{4}-\frac{5}{12}=\frac{1}{3}$ 8) $\frac{1}{3}-\frac{1}{12}=\frac{1}{4}$ 9) $\frac{7}{8}-\frac{1}{4}=\frac{5}{8}$
10) $\frac{2}{3}-\frac{1}{6}=\frac{1}{2}$

PRACTICE 26
1) 17 2) 45 3) 16 4) 26 5) 29
6) 53 7) 55 8) 227 9) 548 10) 327

PRACTICE 27
1) 375 2) 566 3) 376 4) 158
5) 462 6) 219 7) 459 8) 449

9) 178	10) 294	11) 443	12) 637
13) 229	14) 316	15) 370	16) 165
17) 74	18) 178	19) 608	20) 647

PRACTICE 28

1) 258	2) 166	3) 215	4) 139
5) 247	6) 284	7) 294	8) 508
9) 778	10) 324		

PRACTICE 29

1) 316—148 = 168 168 books have been borrowed.
2) 403—167 = 236 There are 236 juniors.
3) 144—57 = 87 We had sold 87 biscuits.
4) 120—78 = 42 She has 42 pages to read.
5) 243—158 = 85 We had another 85 miles to go.
6) 207—184 = 23 We needed 23 runs to draw level. We needed 24 runs to win.
7) 752—585 = 167 Richard must collect 167 more stamps.
8) 105—78 = 27 We will need another £27.
9) 500—14 = 486 The grocer could sell 486 eggs.
10) 256—70 = 186 There would be 186 houses.

PRACTICE 30 *Five stories.*

15 Telling the Time

The minute hand has moved five minutes.
There are five minutes between two numbers next to each other.
The time is 7.23, or 23 minutes past seven.
The time is 2.53, or 7 minutes to three.

PRACTICE 31

1) a) 1.21 b) 21 minutes past 1
2) a) 10.12 b) 12 minutes past 10
3) a) 4.03 b) 3 minutes past 4
4) a) 6.47 b) 13 minutes to 7
5) a) 11.44 b) 16 minutes to 12
6) a) 12.53 b) 7 minutes to 1
7) a) 8.26 b) 26 minutes past 8
8) a) 4.32 b) 28 minutes to 5
9) a) 9.38 b) 22 minutes to 10
10) a) 6.14 b) 14 minutes past 6

16 More Measuring

Estimate and measure.
I could measure the straw, and measure the room in inches, and divide the length of the room by the length of the straw.

PRACTICE 32 *a, b and c may be in any order.*

1) a) How many girls are there in the school?
$204-87=117$ There are 117 girls in the school.

b) How many boys are there in the school?
$204-117=87$ There are 87 boys in the school.

c) How many children are there in the school?
$117+87=204$ There are 204 children in the school.

2) a) By how many votes did Mr. Brown win?
$816-786=30$ Mr. Brown won by 30 votes.

b) How many votes did Mr. Green get?
$816-30=786$ Mr. Green got 786 votes.

c) How many votes did Mr. Brown get?
$786+30=816$ Mr. Brown got 816 votes.

3) a) How many cakes did the baker sell?
$180-27=153$ He sold 153 cakes.

b) How many cakes did the baker have to start with?
$153+27=180$ He had 180 cakes to start with.

c) How many cakes did the baker have left?
$180-153=27$ He had 27 cakes left.

4) a) How many bottles of milk did the milkman leave?
$265+15=280$ The milkman left 280 bottles of milk.

b) How many children were at school?
$280-15=265$ There were 265 children at school.

c) How many bottles of milk were left?
$280-265=15$ 15 bottles of milk were left.

5) a) How many children were there in the school?
$237+34=271$ There were 271 children in the school.

b) How many children ride to school?
$271-237=34$ 34 children ride to school.

c) How many children walk to school?
$271-34=237$ 237 children walk to school.

18 How Long is a Minute?

Various estimates.

PRACTICE 33

1) 1s 7d	2) 1s 5d	3) 2s 4d	4) 1s 3d
5) 3s 8d	6) 2s 3d	7) 1s 9d	9) 1s 5d
9) 8d	10) 2s 8d		

PRACTICE 34

1) 1s 8d	2) 4s 7d	3) 1s 7d	4) 2s 6d
5) 2s 2d	6) 1s 7d	7) 1s 5d	8) 2s 3d
9) 1s 3d	10) 11d	11) 3s 6d	12) 2s 11d
13) 4s 2d	14) 2s 8d	15) 5s 7d	16) 2s 10d
17) 3d	18) 2s 4d	19) 2s 11d	20) 2s 4d

PRACTICE 35

1) 9s 8d÷4 = 2s 5d Each packet cost 2s 5d.
2) 9s 6d÷6 = 1s 7d Father spends 1s 7d each day.
3) 5s 10d=7 = 10d One pint of milk costs 10d.
4) 7s 4d=4 = 1s 10d He must save 1s 10d each week.
5) 7s÷3 = 2s 4d Each child should have 2s 4d.
6) 3s 4d÷4 = 10d 1 lb of sugar costs 10d.
7) 8s 6d÷6 = 1s 5d Each tablet cost 1s 5d.
8) 5s 9d÷3 = 1s 11d Each packet cost 1s 11d.
9) 7s 6d÷2 = 3s 9d One fare was 3s 9d.
10) 10s÷3 = 3s 4d Each child should have 3s 4d.

PRACTICE 36 *Five stories.*

20 Counting on in Hundreds

The tens and units are still the same.
The tens and units do not change when hundreds are added on.

PRACTICE 37
1) 45 145 245 **345** 445 545 **645** 745
2) 737 637 **537** 437 **337** 237
3) 562 **662** **762** 862 962
4) 518 418 **318** 218 118 **18**
5) **693** **593** 493 393 293 193

PRACTICE 38
1) 576 676 776 876 976
2) 492 592 692 792 892 992
3) 659 759 859 959
4) 283 383 483 583 683 783 883 983
5) 360 460 560 660 760 860 960
6) 148 248 348 448 548 648 748 848 948
7) 34 134 234 334 434 534 634 734 834 934
8) 407 507 607 707 807 907
9) 311 411 511 611 711 811 911
10) 225 325 425 525 625 725 825 925

PRACTICE 39
1) $415+500=915$
2) $177+700=877$
3) $42+800=842$
4) $353+600=953$
5) $124+500=624$
6) $286+600=886$
7) $209+700=909$
8) $398+500=898$
9) $460+300=760$
10) $131+800=931$

21 Dinner Money

She puts the half-crowns into piles of eight because there are eight half-crowns in £1, and so each pile is worth £1.
She puts the florins into piles of ten because there are ten florins in £1, and so each pile is worth £1.
There will be 20 shillings in each pile, because there are 20 shillings in £1.
She would put 40 sixpences in each £1 bag.
She puts the threepenny pieces into piles of four, because there are four threepenny pieces in a shilling, and so each pile is worth a shilling.

She would put 40 threepenny pieces in each 10-shilling bag.
She would need 60 pennies to fill a 5-shilling copper-bag.

22 Counting on in Pounds

You have counted £3.

PRACTICE 40

1) 40s = £2	2) 80s = £4
3) 100s = £5	4) 60s = £3
5) 140s = £7	6) 180s = £9
7) 120s = £6	8) 160s = £8
9) 200s = £10	10) 240s = £12

PRACTICE 41

1) 42s = £2 2s	2) 87s = £4 7s
3) 69s = £3 9s	4) 146s = £7 6s
5) 205s = £10 5s	6) 53s = £2 13s
7) 38s = £1 18s	8) 71s = £3 11s
9) 132s = £6 12s	10) 114s = £5 14s

23 Graphs

They put the days along the horizontal axis.
They put the amount of rain on the vertical axis because this is what they found out.
The things we choose to measure go on the x-axis.
The measurements we have found go on the y-axis.

24 Line Graphs

Various tables and graphs.

25 Counting on

2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60

PRACTICE 42

1) $8\times2=16$ 2) $6\times5=30$ 3) $8\times3=24$
4) $9\times3=27$ 5) $8\times4=32$ 6) $9\times2=18$
7) $6\times4=24$ 8) $7\times2=14$ 9) $6\times3=18$
10) $7\times8=56$ 11) $8\times6=48$ 12) $9\times4=36$
13) $6\times6=36$ 14) $7\times4=28$ 15) $9\times5=45$
16) $8\times8=64$ 17) $9\times6=54$ 18) $7\times3=21$
19) $9\times8=72$ 20) $7\times6=42$

26 Naming Angles

We name a line by putting a capital letter at each end.

PRACTICE 43

1) $\angle PQR$ *or* $P\hat{Q}R$ *or* $\angle RQP$ *or* $R\hat{Q}P$
2) $\angle XYZ$ *or* $X\hat{Y}Z$ *or* $\angle ZYX$ *or* $Z\hat{Y}X$
3) $\angle KLM$ *or* $K\hat{L}M$ *or* $\angle MLK$ *or* $M\hat{L}K$
4) $\angle BCD$ *or* $B\hat{C}D$ *or* $\angle DCB$ *or* $D\hat{C}B$
5) $\angle EWH$ *or* $E\hat{W}H$ *or* $\angle HWE$ *or* $H\hat{W}E$

PRACTICE 44

Acute angles: $\angle ABC$ $\angle GHK$ $\angle STU$ $\angle DGL$
Obtuse angles: $\angle LMN$ $\angle VWX$ $\angle PTK$
Right angles: $\angle DEF$ $\angle PQR$ $\angle XYZ$

27 Subtraction

We must add 2 to make 78 up to 80.
We have added 40 to the 24.
We must add 6 to make the 64 up to 70.
Altogether we have added 46.

PRACTICE 45

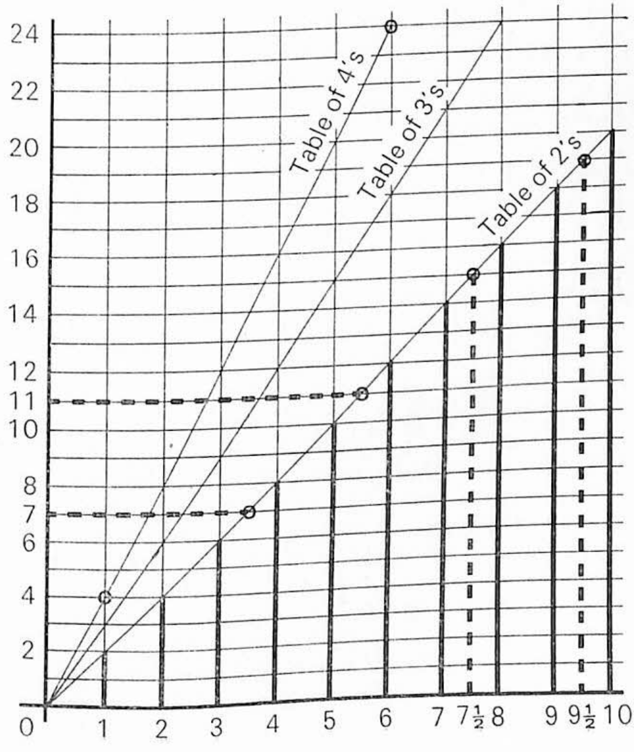
1) $57+3 = 60$, so $60-57 = 3$
2) $31+9 = 40$, so $40-31 = 9$
3) $52+28 = 80$, so $80-52 = 28$
4) $23+47 = 70$, so $70-23 = 47$
5) $18+32 = 50$, so $50-18 = 32$
6) $35+25 = 60$, so $60-35 = 25$
7) $36+64 = 100$, so $100-36 = 64$
8) $89+31 = 120$, so $120-89 = 31$
9) $78+62 = 140$, so $140-78 = 62$
10) $64+46 = 110$, so $110-64 = 46$

PRACTICE 46

1) $80-34 = 46$
2) $60-27 = 33$
3) $120-76 = 44$
4) $53-38 = 15$
5) $90-54 = 36$
6) $70-45 = 25$
7) $110-83 = 27$
8) $84-29 = 55$
9) $100-62 = 38$
10) $130-71 = 59$

28 More Line Graphs

The line joining the tops is a straight line.
The easiest way to draw this line is with a ruler.



x-axis	1	2	3	4	5	6	7	8
y-axis	3	6	9	12	15	18	21	24

The graph is a straight line.
Only two points are needed before the line can be drawn.

x-axis	1	2	3	4	5	6
y-axis	4	8	12	16	20	24

The graph will be a straight line.

1) $2\frac{1}{2}\times4=10$ 2) $4\frac{1}{2}\times4=18$ 3) $3\frac{1}{4}\times4=13$
4) $5\frac{1}{4}\times4=21$ 5) $4\frac{3}{4}\times4=19$ 6) $14\div4=3\frac{1}{2}$
7) $22\div4=5\frac{1}{2}$ 8) $17\div4=4\frac{1}{4}$ 9) $15\div4=3\frac{3}{4}$
10) $23\div4=5\frac{3}{4}$

29 Round Numbers

We need 3 to make 237 up to 240.
We need 60 to make 240 up to 300.
We need 63 altogether.

PRACTICE 47

1) $486+4+10=486+14=500$
2) $579+1+20=579+21=600$
3) $258+2+40=258+42=300$
4) $724+6+70=724+76=800$
5) $361+9+30=361+39=400$
6) $813+7+80=813+87=900$
7) $132+8+60=132+68=200$
8) $607+3+90=607+93=700$
9) $48+2+50=48+52=100$
10) $465+5+30=465+35=500$

PRACTICE 48

1) $563+7+30=563+37=600$ $600-563=37$
2) $678+2+20=678+22=700$ $700-678=22$
3) $316+4+80=316+84=400$ $400-316=84$
4) $747+3+50=747+53=800$ $800-747=53$
5) $821+9+70=821+79=900$ $900-821=79$
6) $59+1+40=59+41=100$ $100-59=41$
7) $105+5+90=105+95=200$ $200-105=95$

8) 492+ 8 = 500 500−492 = 8
9) 230+70 = 300 300−230 = 70
10) 584+ 6+ 10 = 584+16 = 600 600−584 = 16

We need 53 to make 347 up to 400.
We need 200 to make 400 up to 600.

PRACTICE 49

1) 488+ 2+ 10+200 = 488+212 = 700
700−488 = 212
2) 567+ 3+ 30+300 = 567+333 = 900
900−567 = 333
3) 249+ 1+ 50+200 = 249+251 = 500
500−249 = 251
4) 452+ 8+ 40+300 = 452+348 = 800
800−452 = 348
5) 125+ 5+ 70+200 = 125+275 = 400
400−125 = 275
6) 74+ 6+ 20+400 = 74+426 = 500
500− 74 = 426
7) 206+ 4+ 90+300 = 206+394 = 600
600−206 = 394
8) 291+ 9+400 = 291+409 = 700
700−291 = 409
9) 280+20+500 = 280+520 = 800
800−280 = 520
10) 315+ 5+ 80+200 = 315+285 = 600
600−315 = 285

PRACTICE 50

1) 131	2) 257	3) 282	4) 128	5) 498
6) 227	7) 60	8) 464	9) 249	10) 310

30 Symbols

This is a symbol, standing for a car.

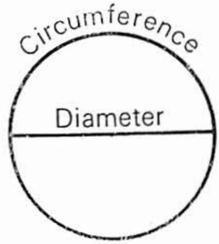
1) Great Britain (*or* the British people)
2) Roundabout 3) Girl Guides Association
4) Britain 5) Barber

Various symbols and their meanings.

1) Plus (*or* Addition) 2) Pound, money
3) Equals 4) Angle 5) Divided by
Each has three objects. 3

31 How Big is a Plate?

It is circular; *or* Its shape is a circle.
Estimates, measurements and account of work done.



32 Sets

PRACTICE 51 *The members may be in any order.*

1) Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday
2) a, e, i, o, u
3) January, June, July
4) 5, 6, 7, 8
5) 0, 2, 4, 6, 8

PRACTICE 52 1) 12 2) various numbers 3) various numbers 4) one 5) 2 6) 0 7) 1 8) 0 9) 26 10) 0

33 The Empty Set

PRACTICE 53 The smallest set we can have has no members.

1) *Three sets.* 2) *Three sets of one member.*
3) *Three null sets.*

34 Addition of Money

PRACTICE 54

1) £1 8s 8d
2) £1 9s 3d
3) £1 14s $0\frac{1}{2}$d
4) £1 14s 4d
5) £1 17s 3d
6) £1 13s 3d
7) £2 10s 2d
8) £2 0s $3\frac{1}{2}$d
9) £6 1s $3\frac{1}{2}$d
10) £7 7s $4\frac{1}{2}$d

PRACTICE 55

1) £1 7s 8d
2) £1 7s 2d
3) £1 18s $5\frac{1}{2}$d
4) £1 15s 7d
5) £1 17s $8\frac{1}{2}$d
6) £1 16s 3d
7) £2 0s 10d
8) £2 3s $4\frac{1}{2}$d
9) £7 19s 8d
10) £9 5s $6\frac{1}{2}$d

PRACTICE 56
1) Father paid £4 19s $2\frac{1}{2}$d altogether.
2) They cost mother £6 7s 9d.
3) They collected £4 18s 4d for the Red Cross.
4) The bus conductor took £9 12s 4d that day.
5) Altogether we took £10 16s 5d on Sports Day.
6) Mother's weekly bills came to £6 9s $0\frac{1}{2}$d.
7) We took £12 8s 9d at the concert.
8) The complete tea set cost £7 2s 6d.
9) The outing cost £13 6s 9d.
10) Father's tool set cost £15 16s 9d.

PRACTICE 57 *Five stories.*

35 Counting on in Sevens

7 14 21 28 35 42 49 56 63 70

7, 21, 35, 49, 63 are odd.

14, 28, 42, 56, 70 are even.

The odd and even numbers are arranged alternately.

The units figures are 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0.

The units include every figure.

PRACTICE 58
1) 7 14 **21** 28 35 **42** 49 56
2) 63 56 **49** 42 35 **28** 21 14
3) 21 28 **35** **42** 49 56 63
4) **35** **42** 49 56 63 70
5) 42 **35** **28** 21 14 7

36 Shapes

There are 4 straight lines in the first shape.

There are 4 right-angles in the first shape.

There are 2 pairs of parallel lines.

Opposite sides are equal.

PRACTICE 59

SHAPE	A	B	C	D	E	F
How many straight lines are there?	4	4	4	4	4	4
How many right-angles are there?	4	4	4	4	4	4
How many pairs of parallel lines?	2	2	2	2	2	2
How many pairs of equal lines?	2	2	2	2	2	2

A rectangle always has 4 straight sides, 4 right-angles and 2 pairs of equal parallel sides.

The rectangles are not all the same shape.

They are all symmetrical. Each has two axes of symmetry.

Shape E has something the others do not have.

The 4 sides are all equal. The length and the breadth are the same.

The squares are not all the same size. They are all the same shape. They are all symmetrical. They are still the same shape when they are turned sideways.

A rectangle is a shape with 4 sides and 4 right-angles.

A square is a rectangle with 4 equal sides.

PRACTICE 60

SHAPE	A	B	C	D	E	F	G	H	J	K
How many sides are there?	4	4	4	4	4	4	4	4	4	4
How many right-angles are there?	4	2	4	0	4	4	0	4	2	4
How many pairs of parallel sides?	2	1	2	1	2	2	0	2	1	2
Are the parallel sides equal?	Yes	No	Yes	No	Yes	Yes		Yes	No	Yes
Are all the sides equal?	No	No	No	No	No	Yes	No	Yes	No	Yes

The first question has the same answer for every shape.
A quadrilateral always has 4 sides.
A, C, E, F, H, K are rectangles. F, H, K are squares.
B, D, G, J are neither squares nor rectangles.

PRACTICE 61

1) $284+284+284=852$ $284\times3=852$
2) $123+123+123+123+123=615$ $123\times5=615$
3) $476+476=952$ $476\times2=952$
4) $236+236+236+236=944$ $236\times4=944$
5) $168+168+168=504$ $168\times3=504$

PRACTICE 62

1) 768 2) 934 3) 592 4) 335 5) 770
6) 1020 7) 865 8) 762 9) 805 10) 852

PRACTICE 63

1) $144\times6=864$ The grocer got 864 eggs.
2) $115\times5=575$ The milkman brought 575 bottles of milk.
3) $365\times2=730$ There are 730 days in two years.
4) $256\times3=768$ Three lorries could carry 768 boxes.
5) $294\times3=882$ 882 people heard the concert.
6) $192\times5=960$ Five boxes would hold 960 tins of meat.
7) $128\times6=768$ 768 passengers could sit in the train.
8) $120\times8=960$ There are 960 sticks of chalk.
9) $288\times3=864$ The gardener had 864 bulbs.
10) $240\times3=720$ There were 720 apples in three crates.

PRACTICE 64

1) A to B: 3 minutes 2) C to D: 4 minutes
3) A to C: 5 minutes 4) C to E: 7 minutes
5) D to F: 6 minutes 6) B to E: 9 minutes
7) C to F: 10 minutes 8) A to E: 12 minutes
9) B to F: 12 minutes 10) A to F: 15 minutes

PRACTICE 65

1) 8.34 a.m. 2) 8.37 a.m. 3) 5.10 p.m.
4) 8.22 a.m. 5) 5.04 p.m.

PRACTICE 66

1) 4 minutes 2) 2 minutes 3) 3 minutes
4) 4 minutes 5) 8 minutes

PRACTICE 67

1) 5.07 p.m. 2) 8.28 a.m. 3) 8.34 a.m.
4) 8.25 a.m. 5) 5 p.m. (*or* 5.00 p.m.)

39 The set of Weights

Each weight is twice the one before it and half the one after it.

$\frac{1}{4}$ oz $\frac{1}{2}$ oz 1 oz 2 oz 4 oz 8 oz 1 lb 2 lb 4 lb

The heaviest weight you could weigh would be 7 lb 15$\frac{3}{4}$ oz. There is no weight less than this that you could not weigh to the nearest $\frac{1}{4}$ oz. The weights cannot be balanced against each other in any way.

Conclusions

PRACTICE 68 1) 39 2) 24 3) 13 4) 14 5) 28

PRACTICE 69

1) 16	2) 25	3) 16	4) 17	5) 27
6) 23	7) 19	8) 38	9) 29	10) 18
11) 37	12) 15	13) 19	14) 15	15) 24
16) 17	17) 14	18) 26	19) 13	20) 18

PRACTICE 70

1) $48 \div 3 = 16$ Each child had 16 toffees.
2) $68 \div 4 = 17$ He should put 17 bushes in each row.
3) $34 \div 2 = 17$ They would need 17 desks.
4) $60 \div 4 = 15$ Each team could use 15 yards of braid.
5) $75 \div 5 = 15$ The farmer should put 15 chickens in each coop.
6) $84 \div 6 = 14$ 14 boxes would be needed.
7) $58 \div 2 = 29$ 29 boys should travel in each coach.
8) $96 \div 6 = 16$ 16 tables would be needed.
9) $70 \div 5 = 14$ 14 books should go in each rack.
10) $52 \div 4 = 13$ The book would last for 13 terms.

PRACTICE 71

SHAPE	A	B	C	D	E	F	G	H	J	K
How many sides are there?	3	3	3	3	3	3	3	3	3	3
How many angles are there?	3	3	3	3	3	3	3	3	3	3
Is there a right-angle?	No	Yes	No	No	No	Yes	Yes	No	No	No
Is there more than one right-angle?	No	No	No	No	No	No	No	No	No	No
Is there an obtuse angle?	No	No	Yes	No	Yes	No	No	Yes	No	Yes
Is there more than one obtuse angle?	No	No	No	No	No	No	No	No	No	No
Are there two acute angles?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are there three acute angles?	Yes	No	No	Yes	No	No	No	No	Yes	No

A triangle always has three sides.
A triangle always has three angles.
The word *triangle* means *three angles.*
A triangle can have one right-angle.
A triangle can have one obtuse angle.
A triangle always has at least two acute angles.
Triangles B, F, G, K are right-angled.
Triangles C, E, H are obtuse-angled.
Triangles A, D, J are acute-angled.

PRACTICE 72

1) £7 4s 8d
2) £8 4s $4\frac{1}{2}$d
3) £9 2s 1d
4) £9 14s 6d
5) £8 16s 8d

PRACTICE 73

1) £1 13s 6d
2) £1 17s 6d
3) £9 9s 8d
4) £7 14s 4d
5) £8 18s $6\frac{1}{2}$d
6) £14 3s $11\frac{1}{2}$d
7) £7 9s
8) £5 0s $4\frac{1}{2}$d
9) £13 12s 6d
10) £13 7s 6d
11) £15 4s
12) £24 19s 2d
13) £29 5s 6d
14) £8 9s 6d
15) £22 9s 9d
16) £19 3s $1\frac{1}{2}$d
17) £18 15s 1d
18) £29 13s 9d
19) £62 2s 8d
20) £39 9s 3d

PRACTICE 74

1) £2 15s 8d×4 = £11 2s 8d Father paid £11 2s 8d for the chairs.
2) £3 16s 9d×6 = £23 0s 6d Mr. Brown should pay £23 0s 6d.
3) £1 17s 11d×8 = £15 3s 4d The stair-carpet would cost £15 3s 4d.
4) £1 3s 5d×9 = £10 10s 9d Maureen had to pay £10 10s 9d.
5) £12 14s 10d×4 = £50 19s 4d We paid £50 19s 6d for the coke.
6) £2 16s 8d×7 = £19 16s 8d He got £19 16s 8d for the oil-heaters.
7) £2 11s 4d×5 = £12 16s 8d He got £12 16s 8d for the hens.
8) £1 15s 6d×9 = £15 19s 6d Mother saved £15 19s 6d in 9 months.
9) £1 9s 7d×3 = £4 8s 9d The journey cost £4 8s 9d.
10) £1 18s 6d×3 = £5 15s 6d Father paid the gardener £5 15s 6d.

Answers may be in any order.

PRACTICE 75

1)	$7\times5=35$	$35\div7=5$	$35\div5=7$
2)	$6\times4=24$	$24\div6=4$	$24\div4=6$
3)	$4\times19=76$	$76\div4=19$	$76\div19=4$
4)	$37\times5=185$	$185\div5=37$	$185\div37=5$
5)	$54\div18=3$	$3\times18=54$	$18\times3=54$
6)	$117\div13=9$	$9\times13=117$	$13\times9=117$
7)	$136\div17=8$	$8\times17=136$	$17\times8=136$
8)	$252\div36=7$	$7\times36=252$	$36\times7=252$
9)	$4\times187=748$	$748\div4=187$	$748\div187=4$
10)	$266\div7=38$	$7\times38=266$	$38\times7=266$

PRACTICE 76

1) a) How many sweets did we have altogether?
$28\times5=140$ We had 140 sweets altogether.
b) How many boxes did we have?
$140\div28=5$ We had 5 boxes.
c) How many sweets were in each box?
$140\div5=28$ There were 28 in each box.

2) a) How many supporters were there?
$36\times3=180$ There were 108 supporters.
b) How many supporters did each coach carry?
$108\div3=36$ Each coach carried 36 supporters.

c) How many coaches were there?
$108 \div 36 = 3$ There were 3 coaches.

3) a) How many people were at the party?
$16 \times 8 = 128$ There were 128 people at the party.

b) How many tables were needed?
$128 \div 8 = 16$ 16 tables were needed.

c) How many people sat at each table?
$128 \div 16 = 8$ 8 people sat at each table.

4) a) How many houses were there?
$14 \times 4 = 56$ There were 56 houses.

b) How many houses were there in each block?
$56 \div 14 = 4$ There were 4 houses in each block.

c) How many blocks of houses were there?
$56 \div 4 = 14$ There were 14 blocks of houses.

5) a) How many books were in the book-case?
$17 \times 5 = 85$ There were 85 books in the book-case.

b) How many books were on each shelf?
$85 \div 5 = 17$ There were 17 books on each shelf.

c) How many shelves were there?
$85 \div 17 = 5$ There were 5 shelves.

44 Changing Fractions

12 single squares will fit on to the largest piece.
Each square is $\frac{1}{12}$ of the whole piece.
There are two twelfths in each double square.
Six double-squares will fit on to the large piece.
Each double-square is $\frac{1}{6}$ of the whole piece.

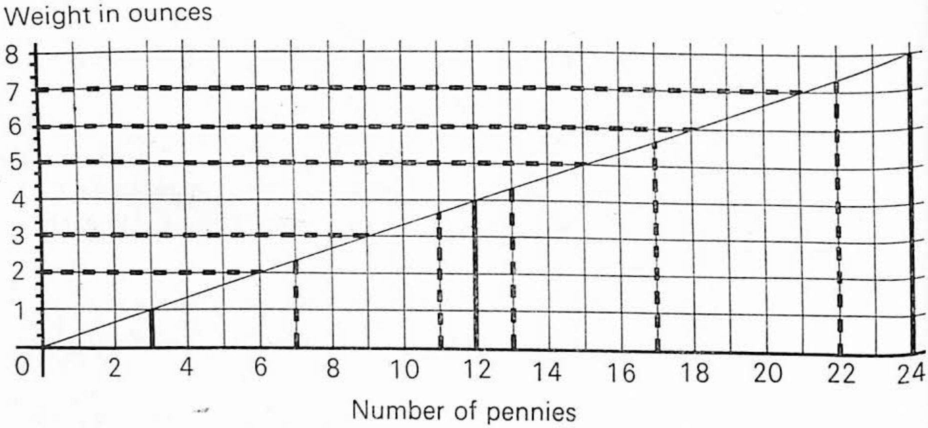
PRACTICE 77 $\frac{2}{12} = \frac{1}{6}$ $\frac{3}{12} = \frac{1}{4}$ $\frac{4}{12} = \frac{1}{3}$ $\frac{6}{12} = \frac{1}{2}$

1) $\frac{1}{3} = \frac{4}{12}$ 2) $\frac{1}{2} = \frac{6}{12}$ 3) $\frac{1}{6} = \frac{2}{12}$ 4) $\frac{1}{4} = \frac{3}{12}$
5) $\frac{1}{12} = \frac{1}{12}$ 6) $\frac{2}{3} = \frac{8}{12}$ 7) $\frac{3}{4} = \frac{9}{12}$ 8) $\frac{5}{6} = \frac{6}{12}$
9) $\frac{4}{6} = \frac{8}{12}$ 10) $\frac{3}{6} = \frac{6}{12}$

45 Weighing Pennies

x—number of pennies	3	12	24
y—weight in ounces	1	4	8

No pennies would weigh no ounces



1) 15 pennies weigh 5 oz.
2) 9 pennies weigh 3 oz.
3) 21 pennies weigh 7 oz.
4) 6 pennies weigh 2 oz.
5) 18 pennies weigh 6 oz.
6) 7 pennies weigh $2\frac{1}{3}$ oz.
7) 13 pennies weigh $4\frac{1}{3}$ oz.
8) 22 pennies weigh $7\frac{1}{3}$ oz.
9) 17 pennies weigh $5\frac{2}{3}$ oz.
10) 11 pennies weigh $3\frac{2}{3}$ oz.

PRACTICE 78

1) $17+15=32$	$32-17=15$	$32-15=17$
2) $8\times93=744$	$744\div8=93$	$744\div93=8$
3) $72-33=39$	$33+39=72$	$39+33=72$
4) $265\div53=5$	$5\times53=265$	$53\times5=265$
5) $67+86=153$	$153-86=67$	$153-67=86$
6) $526-349=177$	$349+177=526$	$177+349=526$
7) $3\times281=843$	$843\div3=281$	$843\div281=3$
8) $851\div37=23$	$23\times37=851$	$37\times23=851$
9) $17\times43=731$	$731\div17=43$	$731\div43=17$
10) $475+358=833$	$833-475=358$	$833-358=475$

PRACTICE 79

1) $6+x=13$
$x=13-6$
$=7$

2) $5\times y=35$
$y=35\div5$
$=7$

3) $11-z=6$
$z=11-6$
$=5$

4) $p-8=15$
$p=15+8$
$=23$

5) $32\div q=8$
$q=32\div 8$
$=4$

6) $a\div 7=3$
$a=3\times 7$
$=21$

7) $b+11=19$
$b=19-11$
$=8$

8) $c\times 6=18$
$c=18\div 6$
$=3$

9) $15\div x=3$
$x=15\div 3$
$=5$

10) $37-y=14$
$y=37-14$
$=23$

47 Circles

The shapes are not all the same size. They are all the same shape.
They are symmetrical. There are no straight lines.
They still look the same when the page is turned round.
They are called circles.

48 Drawing a Circle

The second circle is smaller.
Various circles.
Pattern using circles.

49 Useful Letters

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Two estimates of most common and least common letters.
Table similar to this:

Letter	a	b	c	d	e	f	g	h	i
Number of times used	67	33	39	56	112	35	42		
Round number	70	30	40	60	110	40	40		

Two graphs on the same frame; the blocks should follow the same general pattern.
This information would be useful to
a) any 'maker of letters', e.g. printer, sign-maker
b) a code-breaker

50 Remainders

There are 8 counters in each set. There is one counter left over.
There would be $8\frac{1}{2}$ apples in each group.

PRACTICE 80

1) $38 \div 6 = 6$ rem. 2 He could put 6 eggs into each box, and have two eggs left over, or he could put 6 eggs into each of 4 boxes and 7 into each of the other two.
2) $15 \div 2 = 2\frac{1}{2}$ Each child could have $2\frac{1}{2}$ pies.
3) $9 \div 4 = 2\frac{1}{2}$ Father could use $2\frac{1}{2}$ feet (or 2 ft 6 ins) of string for each parcel.
4) $27 \div 5 = 5$ rem. 2 Father should put 5 in each of 3 rows, and 6 in each of the other two.
5) $37 \div 4 = 9$ rem. 1 There would be 9 in each of 3 teams and 10 in the fourth team.
6) $26 \div 4 = 6\frac{1}{2}$ Each lorry should have $6\frac{1}{2}$ gallons of petrol.
7) $50 \div 6 = 8$ rem. 2 There should be 8 chairs at each of 4 tables, and 9 at each of the other two.
8) $58 \div 4 = 14\frac{1}{2}$ Each piece of cheese weighed $14\frac{1}{2}$ lbs.
9) $30 \div 4 = 7\frac{1}{2}$ Each week the lodger spent 7s 6d on gas.
10) $76 \div 3 = 25$ rem. 1 25 cows should go into each of two sheds, and 26 into the third.

PRACTICE 81 *Five stories.*

51 Adding and Subtracting Fractions

$\frac{1}{3} = \frac{4}{12}$ $\frac{1}{4} = \frac{3}{12}$ There are seven twelfths altogether.

PRACTICE 82

1) $\frac{2}{3}+\frac{1}{4}=\frac{8}{12}+\frac{3}{12}=\frac{11}{12}$
2) $\frac{1}{2}+\frac{1}{12}=\frac{6}{12}+\frac{1}{12}=\frac{7}{12}$
3) $\frac{1}{12}+\frac{5}{6}=\frac{1}{2}+\frac{10}{12}=\frac{11}{12}$
4) $\frac{1}{6}+\frac{5}{12}=\frac{2}{12}+\frac{5}{12}=\frac{7}{12}$
5) $\frac{3}{4}+\frac{1}{6}=\frac{9}{12}+\frac{2}{12}=\frac{11}{12}$
6) $\frac{1}{3}+\frac{1}{12}=\frac{4}{12}+\frac{1}{12}=\frac{5}{12}$
7) $\frac{7}{12}+\frac{1}{3}=\frac{7}{12}+\frac{4}{12}=\frac{11}{12}$
8) $\frac{1}{4}+\frac{1}{6}=\frac{3}{12}+\frac{2}{12}=\frac{5}{12}$
9) $\frac{1}{2}+\frac{5}{12}=\frac{6}{12}+\frac{5}{12}=\frac{11}{12}$
10) $\frac{7}{12}+\frac{5}{12}=\frac{12}{12}=1$
11) $\frac{3}{4}-\frac{1}{3}=\frac{9}{12}-\frac{4}{12}=\frac{5}{12}$
12) $\frac{7}{12}-\frac{1}{2}=\frac{7}{12}-\frac{6}{12}=\frac{1}{12}$
13) $\frac{5}{6}-\frac{1}{4}=\frac{10}{12}-\frac{3}{12}=\frac{7}{12}$
14) $\frac{1}{2}-\frac{1}{12}=\frac{6}{12}-\frac{1}{12}=\frac{5}{12}$
15) $\frac{1}{3}-\frac{1}{4}=\frac{4}{12}-\frac{3}{12}=\frac{1}{12}$
16) $\frac{3}{4}-\frac{1}{6}=\frac{9}{12}-\frac{2}{12}=\frac{7}{12}$
17) $\frac{2}{3}-\frac{1}{4}=\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$
18) $\frac{3}{4}-\frac{2}{3}=\frac{9}{12}-\frac{8}{12}=\frac{1}{12}$
19) $1-\frac{5}{12}=\frac{12}{12}-\frac{5}{12}=\frac{7}{12}$
20) $1-\frac{1}{12}=\frac{12}{12}-\frac{1}{12}=\frac{11}{12}$

52 Naming Sets

PRACTICE 83 *Five sets written down using a capital letter, then braces and comas.*

53 Naming the Empty Set

This is the empty set. Another name for it is the null set.

PRACTICE 84 *Five empty sets, written down with a capital letter, ϕ, and braces.*

54 Subtracting £ s. d.

PRACTICE 85

1) £1 14s 7d
2) £2 13s 10d
3) £1 17s 9d
4) £1 15s 10d
5) £3 4s 9d
6) £2 16s 10d
7) £4 16s 7d
8) £3 16s 10d
9) £4 3s 8d
10) £3 19s 10d

PRACTICE 86

1) £2 16s 7d
2) £4 2s 10d
3) £2 19s 8d
4) £1 11s 9d
5) £3 0s 9d

PRACTICE 87

1) £4 3s $10\frac{1}{2}$d 2) £6 2s $8\frac{1}{2}$d 3) £7 10s $9\frac{1}{2}$d
4) £4 14s $4\frac{1}{2}$d 5) £2 16s 5d 6) £2 16s $5\frac{1}{2}$d
7) £4 14s $3\frac{1}{2}$d 8) £5 14s $8\frac{1}{2}$d 9) £3 16s $5\frac{1}{2}$d
10) £3 5s $6\frac{1}{2}$d

PRACTICE 88

1) £4 12s 3d − £2 15s 6d = £1 16s 9d John must save another £1 16s 9d.
2) £5 7s 6d − £1 11s $7\frac{1}{2}$d = £3 15s $10\frac{1}{2}$d Father has £3 15s $10\frac{1}{2}$d left.
3) £4 7s 3d − £2 15s 9d = £1 11s 6d Mother saved £1 1s 6d.
4) £8 0s 3d − £6 18s 8d = £1 1s 7d We took £1 1s 7d more on the first night.
5) £15 12s 11d − £8 17s 6d = £6 15s 5d Mother had to pay £6 15s 5d.
6) £6 10s − £5 19s 11d = 10s 1d Mrs. Smith saved 10s 1d.
7) £7 10s 4d − £4 12s 6d = £2 17s 10d Mrs. Jones had spent £2 17s 1d.
8) £5 − £3 16s 8d = £1 3s 4d Uncle should have £1 3s 4d change.
9) £4 2s 6d − £3 11s 6d = 11s Robin had an extra 11s.
10) £17 5s 3d − £9 14s 10d = £7 10s 5d He took £7 10s 5d in the afternoon.

56 Dates

Date of pupil's birthday, written in this manner: 7th Oct. 1959.

The 4 stands for April, the fourth month.

PRACTICE 89 *Fifteen dates with names of months, and the same dates with the numbers of the months.*

PRACTICE 90

1) New Year's Day: 1st January 19—; 1.1.—
2) Shrove Tuesday: *various dates*
3) Good Friday: *various dates*
4) Easter Monday: *various dates*
5) All Fool's Day: 1st April 19—; 1.4.—
6) May Day: 1st May 19—; 1.5.—
7) Whit Monday: *various dates*

8) August Bank Holiday: *various dates*
9) Guy Fawkes' Day: 5th November 19—; 5.11.—
10) Christmas Day: 25th December 19—; 25.12.—

57 Counting on in Nines

9 18 27 36 45 54 63 72 81 90

The tens are one less each time.
The units are one more each time.
Adding ten and subtracting one is the same as adding nine.
The first and last numbers (09 and 90) and the second and next-to-last numbers (18 and 81) are reversed.
The other pairs are 27 and 72 36 and 63, 45 and 54.
Each time the tens number and the units number add up to 9.

9
18
45
36
45
54
63
72
81
90

PRACTICE 91

1) 9 18 27 **36** 45 **54** 63 72
2) 90 **81** 72 63 **54** 45 36
3) 36 45 54 **63** **72** 81 90
4) **81** **72** 63 54 45
5) 36 **27** **18** 9

PRACTICE 92

1) £5 7s 9d + £2 16s $4\frac{1}{2}$d = £8 3s $1\frac{1}{2}$d
£8 3s $1\frac{1}{2}$d − £5 7s 9d = £2 16s $4\frac{1}{2}$d
£8 3s $1\frac{1}{2}$d − £2 16s $4\frac{1}{2}$d = £5 7s 9d
2) £15 2s 2d ÷ 4 = £3 15s $6\frac{1}{2}$d
£15 2s 2d ÷ £3 15s $6\frac{1}{2}$d = 4
£3 15s $6\frac{1}{2}$d + £3 15s $6\frac{1}{2}$d + £3 15s $6\frac{1}{2}$d +
+ £3 15s $6\frac{1}{2}$d = £15 2s 2d
NOT *4 × £3 15s $6\frac{1}{2}$d (4 multiplied by £3 15s $6\frac{1}{2}$d)*
3) £1 17s $5\frac{1}{2}$d × 3 = £5 12s $4\frac{1}{2}$d
£5 12s $4\frac{1}{2}$d ÷ £1 17s $5\frac{1}{2}$d = 3
£1 17s $5\frac{1}{2}$d + £1 17s $5\frac{1}{2}$d + £1 17s $5\frac{1}{2}$d = £5 12s 4d
£5 12s 4d − £1 17s $5\frac{1}{2}$d − £1 17s $5\frac{1}{2}$d −
− £1 17s $5\frac{1}{2}$d = 0
4) £9 2s 7d − £6 16s 9d = £2 5s 10d
£2 5s 10d + £6 16s 9d = £9 2s 7d
5) £1 19s 10d + £3 7s 8d = £5 7s 6d
£5 7s 6d − £1 19s 10d = £3 7s 8d
£5 7s 6d − £3 7s 8d = £1 19s 10d

PRACTICE 93

1) a) How much did Jean pay for the doll and the teddy bear?
£1 3s 6d+£1 8s 9d = £2 12s 3d She paid £2 12s 3d for them both.
b) How much did the teddy bear cost?
£2 12s 3d−£1 3s 6d = £1 8s 9d The teddy bear cost £1 8s 9d.
c) How much did the doll cost?
£2 12s 3d−£1 8s 9d = £1 3s 6d The doll cost £1 3s 6d.

2) a) How much did Timothy pay for each car?
17s 6d÷5 = 3s 6d Timothy paid 3s 6d for each car.
b) How much did Timothy pay altogether?
3s 6d×5 = 17s 6d Timothy paid 17s 6d altogether.
c) How many cars did Timothy buy?
17s 6d÷3s 6d = 5 He bought 5 cars.

3) a) How much did Mother bring back?
£4 10s 6d−£2 8s = £2 2s 6d Mother brought back £2 2s 6d.
b) How much did Mother spend?
£4 10s 6d−£2 2s 6d = £2 8s Mother spent £2 8s.
c) How much did Mother take with her?
£2 2s 6d+£2 8s = £4 10s 6d Mother took £4 10s 6d with her.

4) a) How much did Mr. Johnson spend?
£17 6s 3d−£3 10s 4d = £13 15s 11d He spent £13 15s 11d.
b) How much did Mr. Johnson save?
£17 6s 3d−£13 15s 11d = £3 10s 4d He saved £3 10s 4d.
c) How much was Mr. Johnson going to spend?
£13 15s 11d+£3 10s 4d = £17 6s 3d He was going to spend £17 6s 3d.

5) a) How much did Mother pay for the pillow cases?
12s 3d×6 = £3 13s 6d Mother paid £3 13s 6d.
b) How much was each pillow case?
£3 13s 6d÷6 = 12s 3d Each pillow case cost 12s 3d.
c) How many pillow cases did Mother buy?
£3 13s 6d÷12s 3d = 6 Mother bought 6 pillow cases.

58 Area

C is the biggest rectangle. B is the smallest. I know because I counted the squares in each rectangle.
Data for seven rectangles set out in a table like this:

LENGTH	BREADTH	AREA
3 inches	2 inches	6 square inches

The connection between the length, the breadth and the area is that the length multiplied by the breadth gives the area.
A quick way of finding the area of a rectangle is to multiply the length by the breadth. This is because the length tells us how many squares there are in one strip, and the breadth tells us how many strips there are.

LENGTH	BREADTH	AREA
5 inches	4 inches	20 square inches
7 inches	3 inches	21 square inches
8 inches	5 inches	40 square inches
9 inches	4 inches	36 square inches
5 inches	5 inches	25 square inches
8 inches	6 inches	48 square inches

PRACTICE 94

1) $30\times 6 = 180$ We have 180 bottles.
2) $26+28 = 54$ The bus can carry 54 passengers.
3) $52-38 = 14$ She has 14 puzzles to do.
4) $8\times 12 = 96$ There are 96 stamps on one sheet.
5) $36\div 2 = 18$ 18 hair ribbons could be made.
6) $53+50+48 = 151$ 151 passengers arrived altogether.
7) $120-56 = 64$ The grocer had sold 64 tablets of soap.
8) $16\div 6 = 2$ rem. 4 or $2\frac{2}{3}$ Teacher would have to make 3 trips.
9) $38+36+39+37 = 150$ There were 150 children.

10) $144 \times 4 = 576$ There were 576 pencils.
11) $214 - 178 = 36$ The doctor had to see 36 more children.
12) $50 \div 8 = 6\frac{1}{4}$ Each rope could be $6\frac{1}{4}$ feet (6 ft 3 ins) long.
13) $97 + 76 + 28 = 201$ We travelled 201 miles that day.
14) $144 \div 5 = 28$ rem. 4 We could fill 28 packets and we would have 4 biscuits over.
15) $354 + 167 = 521$ We sold 521 tickets.
16) $47 \times 6 = 282$ He delivers 282 papers each week.
17) $315 - 285 = 30$ 30 children were absent.
18) $26 \div 8 = 3\frac{1}{4}$ He took $3\frac{1}{4}$ hours over each chair.
19) $152 - 147 = 5$ We won by 5 runs.
20) $150 \div 7 = 21$ rem. 3 Each child could have 21 toffees and there would be 3 toffees over.

60 Denominators

There are 3 sixths in one half. There are 2 sixths in one third.
We will change to a denominator of 8.

PRACTICE 95

1) $\frac{3}{4}+\frac{1}{8}=\frac{6}{8}+\frac{1}{8}=\frac{7}{8}$
2) $\frac{1}{2}+\frac{1}{4}=\frac{2}{4}+\frac{1}{4}=\frac{3}{4}$
3) $\frac{1}{4}+\frac{3}{8}=\frac{2}{8}+\frac{3}{8}=\frac{5}{8}$
4) $\frac{1}{3}+\frac{1}{4}=\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$
5) $\frac{1}{2}+\frac{3}{8}=\frac{4}{8}+\frac{3}{8}=\frac{7}{8}$
6) $\frac{2}{3}+\frac{1}{6}=\frac{4}{6}+\frac{1}{6}=\frac{5}{6}$
7) $\frac{3}{4}+\frac{1}{6}=\frac{9}{12}+\frac{2}{12}=\frac{11}{12}$
8) $\frac{5}{8}+\frac{1}{4}=\frac{5}{8}+\frac{2}{8}=\frac{7}{8}$
9) $\frac{1}{4}+\frac{2}{3}=\frac{3}{12}+\frac{8}{12}=\frac{11}{12}$
10) $\frac{1}{8}+\frac{1}{2}=\frac{1}{8}+\frac{4}{8}=\frac{5}{8}$
11) $\frac{3}{4}-\frac{5}{8}=\frac{6}{8}-\frac{5}{8}=\frac{1}{8}$
12) $\frac{1}{4}-\frac{1}{6}=\frac{3}{12}+\frac{2}{12}=\frac{1}{12}$
13) $\frac{3}{4}-\frac{1}{3}=\frac{9}{12}-\frac{4}{12}=\frac{5}{12}$
14) $\frac{1}{2}-\frac{1}{3}=\frac{3}{6}-\frac{2}{6}=\frac{1}{6}$
15) $\frac{2}{3}-\frac{1}{4}=\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$
16) $\frac{3}{4}-\frac{2}{3}=\frac{9}{12}-\frac{8}{12}=\frac{1}{12}$
17) $\frac{5}{6}-\frac{1}{4}=\frac{10}{12}-\frac{3}{12}=\frac{7}{12}$
18) $\frac{1}{3}-\frac{1}{4}=\frac{4}{12}-\frac{3}{12}=\frac{1}{12}$
19) $\frac{3}{4}-\frac{1}{6}=\frac{9}{12}-\frac{2}{12}=\frac{7}{12}$
20) $1-\frac{3}{8}=\frac{8}{8}-\frac{3}{8}=\frac{5}{8}$

PRACTICE 96

1) $\frac{3}{6}=\frac{1}{2}$ 2) $\frac{4}{12}=\frac{1}{3}$ 3) $\frac{2}{8}=\frac{1}{4}$ 4) $\frac{2}{12}=\frac{1}{6}$
5) $\frac{4}{8}=\frac{1}{2}$ 6) $\frac{8}{12}=\frac{2}{3}$ 7) $\frac{6}{8}=\frac{3}{4}$ 8) $\frac{10}{12}=\frac{5}{6}$
9) $\frac{4}{6}=\frac{2}{3}$ 10) $\frac{9}{12}=\frac{3}{4}$

PRACTICE 97

1) $\frac{7}{12}+\frac{1}{12}=\frac{8}{12}=\frac{2}{3}$
2) $\frac{1}{3}+\frac{1}{6}=\frac{2}{6}+\frac{1}{6}=\frac{3}{6}=\frac{1}{2}$

3) $\frac{1}{4}+\frac{1}{12}=\frac{3}{12}+\frac{1}{12}=\frac{4}{12}=\frac{1}{3}$
4) $\frac{1}{6}+\frac{1}{12}=\frac{2}{12}+\frac{1}{12}=\frac{3}{12}=\frac{1}{4}$
5) $\frac{7}{12}+\frac{1}{4}=\frac{7}{12}+\frac{3}{12}=\frac{10}{12}=\frac{5}{6}$
6) $\frac{1}{2}+\frac{1}{6}=\frac{3}{6}+\frac{1}{6}=\frac{4}{6}=\frac{2}{3}$
7) $\frac{7}{12}+\frac{1}{6}=\frac{7}{12}+\frac{2}{12}=\frac{9}{12}=\frac{3}{4}$
8) $\frac{1}{4}+\frac{5}{12}=\frac{3}{12}+\frac{5}{12}=\frac{8}{12}=\frac{2}{3}$
9) $\frac{1}{3}+\frac{5}{12}=\frac{4}{12}+\frac{5}{12}=\frac{9}{12}=\frac{3}{4}$
10) $\frac{3}{4}+\frac{1}{12}=\frac{9}{12}+\frac{1}{12}=\frac{10}{12}=\frac{5}{6}$
11) $\frac{1}{3}-\frac{1}{12}=\frac{4}{12}-\frac{1}{12}=\frac{3}{12}=\frac{1}{4}$
12) $\frac{7}{12}-\frac{1}{4}=\frac{7}{12}-\frac{3}{12}=\frac{4}{12}=\frac{1}{3}$
13) $\frac{3}{4}-\frac{7}{12}=\frac{9}{12}-\frac{7}{12}=\frac{7}{12}=\frac{1}{6}$
14) $\frac{11}{12}-\frac{1}{4}=\frac{11}{12}-\frac{3}{12}=\frac{8}{12}=\frac{2}{3}$
15) $\frac{5}{6}-\frac{7}{12}=\frac{10}{12}-\frac{7}{12}=\frac{3}{12}=\frac{1}{4}$
16) $\frac{3}{4}-\frac{5}{12}=\frac{9}{12}-\frac{5}{12}=\frac{4}{12}=\frac{1}{3}$
17) $\frac{2}{3}-\frac{1}{12}=\frac{8}{12}-\frac{1}{12}=\frac{7}{12}$
18) $\frac{11}{12}-\frac{3}{4}=\frac{11}{12}-\frac{9}{12}=\frac{9}{12}=\frac{1}{6}$
19) $\frac{7}{12}-\frac{1}{3}=\frac{7}{12}-\frac{4}{12}=\frac{3}{12}=\frac{1}{4}$
20) $\frac{5}{6}-\frac{1}{2}=\frac{5}{6}-\frac{3}{6}=\frac{2}{6}=\frac{1}{3}$

61 More Areas

There are 2 strips because the card is 2 inches wide.
In each strip there are 3 square inches.
OR There are 3 strips because the card is 3 inches wide.
In each strip there are 2 square inches.
There are 6 square inches altogether.
2×3 sq. ins $= 6$ sq. ins
4×3 sq. ins $= 12$ sq. ins
3×3 sq. ins $= 9$ sq. ins
1) 15 sq. ins 2) 24 sq. ins 3) 8 sq. ins 4) 20 sq. ins
5) 18 sq. ins *and various other areas.*

PRACTICE 98

1) $7\times 5=35$ There were 35 pigs in 7 sties.
$35+8=43$ The farmer had 43 pigs.
2) $6\times 12=72$ Each sheet has 72 stamps.
$72\times 8=576$ There are 576 stamps.
3) $24\times 6=144$ We had 144 exercise books.
$144-56=88$ There were 88 books left.

4) $27+30=57$ One bus could carry 57 people.
$57\times5=285$ Five buses can carry 285 people.

5) $65\div5=13$ Each child had 13 chocolates.
$13-4=9$ Tom had 9 chocolates left.

6) $98\div7=14$ There were 14 postcards in each packet.
$14\times3=42$ He had 42 cards left.

7) $3+2=5$ We are at school 5 hours each day.
$5\times5=25$ We are at school 25 hours each week.

8) $215\div9=23$ rem. 8 There were 8 apples over.
$8\div4=2$ Each child had 2 apples.

9) $96+67=163$ Father went 163 miles.
$183-163=20$ He still had 20 miles to go.

10) $6+8=14$ Each house has 14 windows.
$14\times9=126$ He was paid 126 shillings (£6 6s).

11) $3\times36=108$ There were 108 sheets of paper.
$108\div8=13\frac{1}{2}$ Each child could have $13\frac{1}{2}$ sheets.

12) $32+27+35=94$ There were 94 children on 3 coaches.
$124-94=30$ There were 30 children on the fourth coach.

13) $180-9=171$ There were 171 eggs.
$171\div6=28$ rem. 3 He needed 28 boxes, and had 3 eggs over.

14) $43-27=16$ 16 people were left on the bus.
$16+34=50$ There were 50 people on the bus.

15) $48+30+36=114$ There were 114 sweets altogether.
$114\div6=19$ We should each have 19 sweets.

16) $125-30=95$ Each boy had 95 stamps left.
$95\times3=285$ They had 285 stamps altogether.

17) $83-30=53$ Peter shared 53 conkers among his friends.
$53\div4=13$ rem. 1 Each friend had 13 conkers. Peter had 31 conkers.

18) $87\div3=29$ Each child had 29 marbles.
$29+34=63$ Bob had 63 marbles.

19) $427-156=271$ The factory used 271 tons of steel last week.
$427+271=698$ 698 tons were used in two weeks.

20) $171 \div 7=23$ Each box weighed 23 lbs.
$23 \times 5=115$ 5 boxes weigh 115 lbs.

PRACTICE 99

1) 30 sq. ins
2) 28 sq. ins
3) 24 sq. ins
4) 35 sq. ins
5) 48 sq. ins
6) 36 sq. ins
7) 24 sq. ins
8) 21 sq. ins
9) 54 sq. ins
10) 32 sq. ins

PRACTICE 100

1) 16 sq. ins
2) 36 sq. ins
3) 49 sq. ins
4) 25 sq. ins
5) 64 sq. ins

Longmans' Junior Mathematics

Stages 1, 2, 3, 4, 5

and accompanying teacher's guides

N V Brindley